

SEQUENCE LISTING

SEQ ID NO: 1 (*Haemophilus aegyptius*)

MKRNLKQSVIAVLIGGTTVSNYALAQAAQAAQVKKDELSELKKQVKEMDAAIDGILDDNIAYEAEVDAKLDQHSAALGRHTNRLNNL
KTIAEKAKGDSSEALDKIEALEEQNDFLADITALEEGVGDLDDDIAGIQDNISDIEDDINQNSADIATNTAAIATHTQLRDNLNRV
NNLNKDLKRGGLAAQAAALNGLFQPYNVGKLNLTAAVGGYKSOTAVAVG

SEQ ID NO: 2 (*Escherichia coli*)

MKTVNVALLALIISATSSPVVLAGDTIEAAATELSAINGMSQSEIEQKITRFLERTDNSPAAYTLYTEHHYIPSETPDTTQTPTVQTDPDAGQKTVAAATGDVQTTARYQSMINARQSAVTDAQQTQITEQQAQIVATQKTLAATGDTQNTAHQEMINARLAAQNEANQRTATEQGQKMNALTIDVAVQQQNERTQYDQKMQMSLAQESQAQAHQIDSLSQDVTQTHQQLNTQKRVADNSQQINTLNNHFSSLKNEVDDNRKEANAGTASAIAIASQPQVKTGDMVMVSAGAGTFNGESAVSVGTSFNAGHTVULKAGISADTQSDFGAGGVGVGYSF

SEQ ID NO: 3 (EHEC)

MNKIFKVIWNPATGNYTVTSETAKSRGKSGRSKLLISALVAGGMSSFGALANAGNDNGQGVYDGSAGDGVWAIGKGAKANTFMNTSGSSTAVG
YDAIAEQGYSSAIGSKTHAIGGASMAFGVSAISEGDRSIALGASSYSLGQYSMALGRYSKALGKLSIAMDSSKAEGANAIALGNATKATEIMSIAL
GDTANASKAYSMALGASSVASEENAIAGAETEAAENATAIGNNAKAGTNSMAMGFGSLADKVNTIALGNGSQALADNAIAIGQGNKADGVDAIAL
GNGSQSRLNLTIALGTASNATGDKSLALGSNSSANGINSVALGADSIADLDNTSVGNSSLRKIVNVNGAIKSDSYDAINGSOLOYAISDSVAKRL
GGGAADVDDGTVTAPTYNLKNGSKNNVGAALAVLDENTLQWDQTKGKSYAAHGTSSPTASVITDVADEGTISASSKDAVNGSQLKATNDDVEANTAN
IATNTSNIATNTNIAITNTTNTLTDVGDLQADALLWNETKKAFSAAHGQDTTSKITNVKDADLTADSTDAVNGSQLTTNDAVATNTTNIANNT
SNIATNTTNIISNLTEVTNLGEDALKWDKDNGVFTAHHGTETTSKITNVKDGLTTGSTDAVNGSQLKTTNDAVATNTTNIATNTTNIISNLTEVTN
LGEDALKWDKDNGVFTAHHGNNTASKITNILDGTVTATSSDAINGSQLYDLSSNIATYFGGNASVNTDGVFTGPYKIGETNNYNGDALAAINSF
STSLGDALLWDATAKGFSAKHGTNGDASVITDVADEGEISDSSSDAVNGSQLHGVSYVVDALGGGAEVNADGTITAPTYTIANADYDNVGDALNAID
TTLDDALLWDADAGENGAFSAAHGKDTASVITNVANGAISAASSDAINGSQLYTTNKYIADALGGDAEVNADGTITAPTYTIANAEYNNVGDALDA
LDDNALLWDETANGGAGAYNASHDGKASIITNVANGSISEDSTDAVNGSQLNATNMIEQNTQIINQLAGNTDATYIQENGAGINYVRTNDGGLAFN
DASAQGVGATAIGYNSVAKGDSVVAIGQGSSYSDVTGIALGSSVSSRVIAGKSRDTSITENGVIGYDTTDGELLGALSIGDDGKYRQIIINVADGS
EAHDATVRLQNAIGAVATTPTKYFHANSTEEDSLAVGTDISLAMGAKTIIVNGDKGIGIGYGYAVDANALNGIAIGSNAQVIHVSIAIGNGSTTR
GAQTNYTAYNMDAPQNSVGEFSVGSADGQRQITNVAAQSAADTDAVNVGQLKVTDAQVSQNTQSITNLDRVTNLDSRVTNIENGIDIVTTGSKYF
KTNTDGVDASAQGKDSVVAIGSGSIAAADNSVALGTVSATEENTISVGSSTNQRRITNVAAQKNATDAVNVAQLKSEAGGVRYDTKADGSIDYSNI
TLGGGNGGTTRISNVSAGVNNNDVVNYAQLKQSVQETKQYTDQRMVEMDNKLSKTESKLSGGIASAMATGLPQAYTPGASMISIGGGTYNGESAVA
LGVMSVMSANGRWVYKLQGSTNSQGEYSAALGAGIQW

5 **SEQ ID NO: 4 (*Actinobacillus actinomycetemcomitans*)**

MTYQLFKHHI VALMVTGAI SVNALAKDSFLENPSANLPQQVKNRVDIFNNETNINENKKDIAINKANIASIEKDVMRNTGGIDRLAK
QELVNRARITKNELDIKNKTSIAENTASIARIDGNLEGVNRLQNVDRSTENAARSRANEQKIAENKKAIENKADKADVEKNRADI
AANSRAIATFRSSSQNIAALTTKVRNTARI DRLLDSRVNELDKEVKNGLASQALSGLFQPYNVGSLNLSAAVGGYKSXTALAVGSGY
RFNQNVAAKAGVAVSTNGGSATYNVGLNFEW

SEQ ID NO: 5 (*Haemophilus somnus*)

MKKVQFFKYSSLALALGLGVASALAAPTSTTTGPEAPPTGPAPTAKDPLAETALAYDLENEVAYLRMKAGEWMQQLGLDPEKEVIKGWNEVKSLPRIDGNKGDKQTKDQIAMLIRTVDNTKELGRIVSTNIEDIKNLKKELYGFVEDVNESEARNISRIDENEKDIKNLKKELYDFVEDVNESEARNISRIDENEKDINTLKELMDEDLNSVLTQIEDVKLTQDVNDNVNLAFEEINGNAQKFDTAIEGLTSGLSDLQAKVDANKQETEDDIADNAKAIHSNTKGIAKNTKDIRDLDTKTKQMLENDKNLMTGLESLATETSKGFERFDVKTQQLDQAVANVVGRVDITEQAIRQNTAGLVNVNKRVDTLKNTKAGIASAVALGMLPQSTAPGKSLVSLGVGHHRGQSATAIGVSSMSSNGKWWVKGGMSYDTQRHATFGGSVGFFFN

SEQ ID NO: 6 (*Haemophilus ducreyi*)

MKIKLVAVGGLACSTITTMAQPPK FAGVSSLYSYEYDYGKGKWTWSNEGGFDIKVPGIKMKPKEWISKQATYLELQHYMPYTPVVLV
TSAPDVS PSSISILYPMSDPDLGINRQQLKLNLYSYFNDLRLHDFLKVL DARISKNKQNIDTISKYLLELGTYLDGSYRMMEQNTH
NINKNTHNINKNTHNINKL SKELQTGLANQSALSM LVQPNVGKTSVSAAVGGYRDKTALAIGVGSRITDRFTAKAGVAFNTYNGGMS
YGA SVGYEF

SEQ ID NO: 7 (EPEC)

MKTVNVALLALIISATSSPFVLAGDTIEAAATELSAINSGMSQSEIEQKITRFLERTDNSPAAYTLYTEHHYIPSETPDTTQTPVQTDPDAGQKTVAAATGQVTTARYQSMINARQSTVTDAQQTQITEQQAQIVATQKTLAATGDTQNTAHYQEMINARLAAQNEANQRTTTEQGQKMNALTTDVAQQQKERAQYDKQMOSLAQKSVQAHEQIESLRQDSAQTQQQLNTQKRVADNSQQINTLNNHFSSLKNEVEDRKEANAGTASAAIAASOPOVKTDLMMVSAGAGTFNGESAUVGTSFNAGHTVULKAGISADTOSDFGAGGVGVGYSE

SEQ ID NO: 8 (EAEC)

MKTVKLSLLAVVATAVSPSAFAGDTVEAATTELTVIQPQMSQSEIDQKIGRFLERTGNSVAAQNYLIAHDYQTTTPQENTAASPVQP
TNTLNPITNQAQTDRDNGQDTAIQDAQHAANWASLKAADDAQHAITVQAQTDIDANTAAITDTRNDVSAVQSDVTNIKGDVAAQSTADH
ANANANTALINGVKLSGAVTENKNNIEQNRSDIADQQKLLASNEQKQIVRDNGQDTAIQDAQHAANWASLKAADDAQHAITVQAQTDIDA
NKAAITDIRNDVSAVQSDVTNIKGDVAAQSTADHANANANTALMNGVKLSSAVTENKNNIEQNRSDIADQQKLLASNEQKQIVRDNG
QDTAIQDAQHAANWASMKADDAQHAI TVAQTDIRNDVSAVQSDVTNIKGDVAAQSTADHANANANTALINGVKLSGA
VTENKNNIEQNRSDIADQQQQLDETRKIVAAATGDVQTAARYQSMIDARQTAANAAQQAQADTQQQQMDDQQKQIDATQKTVSALGDAQ
TNAHYQEMVNAGLRAQNDANARTAAEQKQKIDTTLATNQATQQHINSVQYGEQIQRLAQDSTQTHEQIDSLSQDVTQTHQQLSNTQKRV
ADNSQOITTLNNHFSSLKNEVEDNRKEANAGTASAIAIASQPQVKAGDFMMSAGAGTFNGESAVVGTSFNAGHTHTVIKAGVSADTQ
SDFGAGVGVGYSF

SEQ ID NO: 9 (EAEC)

SEQ ID NO: 10 (UPEC)

MNKIFKVWIWNPATGSYTVASETAKSRGKKSRSKLLISALVAGGLLSSFGASADNYTGQPTDYGDSAGDGWVAIGKGAKANTFMNTS
GASTALGYDAIAEHEYSSAIGSKTLATGGASMAFGVSAKAMGDRSVALGASSVANGDRSMAFGRYAKTNFTSLAIGDSSLADGEKTI
ALGNTAKAYEIMSIALGDNANASKEYAMALGASSKAGGADSLAFGRKSTANSTGSLAIGADSSSSNDNIAIAGNKTQALGVNSMALGN
ASQASGESSIONALGNTSEASEQNAIALGQGSIAKVNLSALGSNSLSGENIALGEGBAAGGSNSLAFGQSQRANGNDVAIGVGA
ATDNTSVAIGAGSTTDASNTVSGNSATKRKIVNMAAGAISNTSDAINGSQLYTISDVSVAKRLGGGATVGSMDGTVTA
NVGDALSGIDNNTLQWNKTAGAFSANHGANATNKITNVAKGTVSATSTDVNVGSQLYDLQQDALLWNGTAFSAAHGEATSKITNVTA
GNLTAGSTDVNSQLKTTNDNVTNTNIATNTTNTLTDVNGLGDDSSLWNKAAGAFSAAHGEATSKITNVTAGNLTAGSTDVNSQLKTTN
VNSQLKTTNDNVTNTNIATNTTNTLTDVNGLGDDSSLWNKTAGAFSAAHGTDATSKITNVKAGDLTAGSTDVNSQLKTTNDNVTNTNI
TNLTDVNGLGDDSSLWNKTAGAFSAAHGTDATSKITNVKAGDLTAGSTDVNSQLKTTNDNVTNTTNTLTDVGDLKDDSSLW
NKAAGAFSAAHGEATSKITNLLAGKISSNSTDAINGSQLYGVADSFSTSYLGGGADISDTGVLSGPTYTIGGTDYTNVGDALAAINTS
FSTSLGDALLWDATAKGFSAKHGINNAPSVIDVANGAVSSTSSDAINGSQLYGVSDIADALGGNAVNTDGSITTPTYAIAGGSYN
NVGDALEAIDTLLDDALLWDTTANGGNGAFSAAHGDKTASVITNVANGAVSATSNDAINGSQLYSTNKIADALGGDAEVNADGTIT
APTYTIANTDYNNGEALDLDNNALLWDEDAGAYNASHDGNASKITNVAGDLSTTSTDVNSQLNATNILVTQNSQMINQLAGNT
SETYIEENGAGINYVRTNDSGLAFNDASASGIGATAVGYNNAVASHASSVAIGQDSIEVDTGIALGSSSVSSRVIVKGTRNTSVSEEG
VVIGYDTTDGELLGALSIGDDGKYRQIINVADGSEAHDAVTVRQLQNAIGAVATTPTKYYHANSTAEDSLAVGEDSLAMGAKTIVNGN
AGIGIGLNTLVLADAINGIAIGSNARANHADSIAMGNGSQTTRGAQNTYATNMDAPQNSVGEFSGSEDGQRQITNVAGSA
TNVAGQLKVTDAQVSQNTQSITNLNTQVTNLDRVTNIENGIGDIVTGTSTKYFKTNTDGADANAQGKDSVAIGSGSIAADNSVALGTG
SVADEENTISVGSSTNQRRITNVAGVNATDAVNSQLKSSEAGGVRYDTKADGSDYNSITLGGGNSTTRISNVSAGVNNNDAVN
AQLQSVQETKQYTDQRMVEMDNKLSKTESKLSGGIASAMMTGLPQAYTPGASMASIGGGTYNGESAVALGVSMVSANGRWVYKLQG
STNSOGEYSAALGAGIOW

SEQ ID NO: 11 (*Shigella flexneri*)

MTNLGEDALKWDKDNGVFTAAGTETTSKITNVKGDLTTGSTDAVINGSQLKTTNDAVATNTNIATNTNIISNLTEVTNLGEDALKWDKDNGVFTAAGNNTASKITNILDGTVTATSSDAINGSQLYDLSSNIATYFGGNASVNTDGVFTGPYKIGETNYYNVGDALAAINSFSTSLSGDALLWDATAGKFSAKHGHTNGDASVITDVADGEISDSSSDAVNGSQLHGVSYYVDALGGGAEVNADGTITAPTYTIANADYDNVGDALNAIDTTPDALLWDADAGENGAFSAAHGKDKTASVITNVANGAISAASSDAINGSQLYTTNKYIADALGGDAEVNADGTITAPTYTIANAEYNNVGDALDDNALLWDKTANGGAGAYNASHDGKASIITNVANGSISEDSTDAVINGSQLNATNMMEQNTQIINQLAGNTDATYIEENGAGINYVRTNDNDLAFNDASASGVGATAVGYNAVASGASSVAIGQNSSSVTDTGIALGSSSVSSRVIAKGSRTSVTENGVVIGYDTTDGELLGALSIGDDGKYRQIINVADGSEAHDAVTVRQLQNAIGAVATTPTKYFCHANSTAEDSLAVGEDSLAMGAKTVVNGNAGIGIGLNTLVLADAINGIAIGSNARAHANSIAMGNGSQTRGAQTYTAYNMDAPQNSVGEFSGSEDGQRQITNVAAAGSADTDAVNQQLKVTDERVAQNTQSITNLNNQVTNLDRVTNIENGIGDIVTTGSTDKYFKTNTDGVDANAQGKDSVAIGSGSIAAADNSVALGTGSVAEEENTISVGSSTNQRRTNVAAVNADAVNVSQQLSSEAGGVRYDTKADGSIDYSNITLGGNGSTTRISNVSAGVNNNDAVNYAQLQSAQETKQYTDQRMVEMDNKLSKTESKLSGGIASAMAMTGLPQAYTPGASMASIGGGTYNGESAVALGVMSVMSANGRWVYKLOGSTNSQGEYSAALGAGIOW

SEQ ID NO: 12 (*Brucella melitensis*)

MSFFKKNISITAMGGLMLSALVDAAKAEEVNSQVKLPPVFELVENQGLANIALIRPRVIAPDNNLRPGGIVSGIAGLLTLGQENRNLISENRQVINNNNTAIGQNRTSISTNAKGVDNRRAAIQRNSAAISALGQRVDGLQGQINSARKEARAGAANAALSGLRYDNRPKGVSIAVGVGGFKGSTALAGIGYTSKNEENARYNVSVAYNEAGTSWNAGASFTLN

SEQ ID NO: 13 (*Brucella suis*)

MSFFKKNISITAMGGLMLSADVDAAKAEEENSVQVKLPPVFELVENQGLANIALIRPRVIAPDNNLRPGGIVSGIAGLLTLGQENRNLISENRQVINNNNTAIGQNSDRIADAKGVADNRRAIGQNSGRIDANAKGVADNKAAIGRNSGRIDANAKGVADNKTAIGRNSGRIDNAKGVADNRRAISQNRRGRINANAAGVASNRRAIRQNSAAISALGQRVDGLQGQINSARKEARAGAANAAALSGLRYDNRPKGKVSIATGVGGFKGSTALAAGIGYTSKNENARYNSVAYNEAGTSWNAGASFTLN

SEQ ID NO: 14 (*Ralstonia solanacearum*)

5 **SEQ ID NO: 15 (*Sinorhizobium meliloti*)**

MALGRQSVSAGSGSIAFGNGSYANSNGSVAIQSAYAANVRAIAIGGDAFAWREAEQTAKAGGSQSIAMGVRARTKSLVVDDPDTVAN
EADPGGASDAIAIGTDAQANGDRSLAIGRQNQAGNEQSIGIGAGNTATGKLSIGIGSSNVASGEQSLSLGAGNNALGQGSISIGTETT
AGGLRSIAFGVRASTKEANLDIPDDVAIIDAIAIGTNTKANGDRSVS1GTGSQASSGAVSIGDAAKAVGDKSVS1GTESWADGDESVS
IGLVNNAGFEGNDRIKGGQTSVSLGAFNQSPGIEAIAIGARNEANADRSIAIGSRAKTKAADPAQADGGARDAVAIGTDALANDRSI
SIGWNSSTSLSNDSISIGTRATSGSAGDIMIGTGSCTSGQNNVALGVAASQVKVKGSSNIAIGDSAGGSREGDNNVAIGTNAGIQFS
ESEHETAVRADLVSDAVSIGNEALASADEAIAIGTGAVASGLKSISIGVGNTVSGASSGAIGDPTDITGTGSYSLGNDNTIAADNAG
TGFNDNTLADAADGSRVIGNGNNDVSDAVFLGNGADVTEVGGVALGSGSVDTGADVAGYVPGGASTADQNAIEATQSTRGAVAVGN
PDAETGVYRQITGVAAGTADSAAVNAQLKSVETIAKTVWKLTDGSIDGIGPDELVLKGGDGNIVISNQILSNDVSIDLADIEV
NRVTARDPDTGASTVLDENGLSFTTDQANGEDTALGPRVTAAGIQAGKITNVAAAGEADTDVNFSQLRQVETASGNTDQRRAVKYDWT
DANTNGVIDEGERNLDSVTLAGGMGGTRISNLAPGALSAASTDAVNGSQLFGLRSRVSNVALGGGAAYDPVKDEWIAPKYTIGGT
YSNVDALAAVGGTAGAGWSLSAQGANASNVAPGETVDLRSGDGNIIVSKAETGDTVSFDIADDLVSEISITVGADPAPNAPTTVIT
GGSIVIGSTMLGSNGLVITGGPSVTTDGDAGGMKVTNVANGTVAKDSKDAVNGQLFDVANATANGVYDDSKKGTLLEGANGTK
ITNVAAAGDLNANSTDAVNGSQLYATNVKVDRLTEVKEIDSRTVYIESFQGDLENAAVYDTDAAGKRLNLTLEGGDPDKPVLIANVA
KGVKATDAVNVGQLDSEVAESKSYTDEKTEWAIDQAAIYTQVIETKVSAVNNYAQQRFAQLSGEIGQVRSEARQAAIGLAAASLRF
DNEPGKLSVALGGGFWRSEGALLFGAGYTSEDGRVRANLTGAAAGGNNVVGAGLISITLN

SEQ ID NO: 16 (*Bradorhizobium japonicum*)

MRAFGSGNAINGTNYAAGSNNVAGNNGAVVSGNGVTGDNATAFGSSIGIAGGNNAAVGSFSTVTGSNSAAGSFNNVGNNSGAG
GTGQNIRGNGTFAIGDPNIVNGNNSLVFGDNNTVNGSNVAGRGDNIQLVSNNNTIAATSSAAGSSVFGSGNTVATNAVVMGNNTVS
GASSVAIGNGTAVTGINAIAMGTGAGANFDMSVAIGSGATTTRANQAVGTTASSTYTMMSGITSAAASKAAQSGPQLVTSDAAGNLATT
SLAGLGLASAGDINGINSQLAALNGRVDNLTRESRGGVVALALAASSLQFDPRPGKISVSGGGFNFQGQSGLAVGLGYSYSDAMRFNA
FTAACOOGAIGVRAAGASWTLN

SEQ ID NO: 17 (*Burkholderia fungorum*)

MNKTYRSVWNESTGTWVAASEHASARGKKSSAKTSSTKAVVGLAAGLYGADAFALGGGLTCPTEGSAGYTAGSASSANGAYCG
SDYQWGLFSNTNADGSKSGQPIGAAIEGMNDGSLLYGPNNIVMKNLSMSNNKIINLAPGTVSSTSADAVNGSQLYATQNQVSNIGN
TVNNITTGAGIMYFVNSTLADSTANGVNSIAIGGATRTDANNSISIGTGLTQASSNTGAIAGQNASINVGANSIAIGTSATGGI
GGIALGENAFATGGKMLALGSGASATTANSVALGSGSTTANLTAAGYNPGSGTLAGTSQATNGEVSGNAGAERRITNVAAAGSAAT
DAVNVSQLOQSEDAKVNTINNNVNNLSGSVTNISSTVNNITNGGGIKYFCHANSTQADSSATGTDAVAIGGNAQATAANSVALGLNSTSK
GTNAIALGGAVAGGSYAFAGSLALAATTGDIALGSSATASSANSNAYATALGTNALANATDATAIIGEGASATAASSVALGARSKTTA
NLSTAGYNPGTGTLSGTTPTGEVSVGSAGKERRVTNVAAAGSAATDAVNVSQLOMSEDAKVNTINNNVNNLSNNVNTNIAGNVTNISNTVN
NITNGGGIKYFVNSTLADSSAGGTNSIAIGGATTGNVTAGTSDNISIGTNATTNYGKNIAGGNAQALGGAYDGGYNTAIGENAIA
KGDGAGGFGGGGWQTTAIGGGSQALHDNTTAVGSGAIANVANATALGMSASATAGSIALGQGAVASAANSVALGSGSTTXNLSAA
GYNPGTGTLSGIASVANGEVSVGAAGKERRITNVAAAGSAATDAVNVSQLOQSEDAKVNTINNNVNNLSGSVTNISNTVNNITNGGGIKY
FHTKSTLADSSATGTDAVAIGGNAQATAANSVALGSNSTTANLSAAGYNPGTGLSGIASAANGEVSVGAAGKERRITNVAAAGSAAT
DAVNVSQLOQSEDAKVNTISNNVNNLSGSVTNISSTVNNITNGGGIKYFHTNSTLADSTANGVNSIAIGGATRTDANNSISIGTGLTQA
SSNTGAIAGQNASINVGANSIAIGTNSATGGIGGIALGENAFATGGKMLALGSGASATTANSVALGSGSTTANLTAAGYNPGSG
TLAGTSQATNGEVSVGNAGAERRITNVAAAGSAATDAVNVSQLOQSEDAKVNTINNNVNNLSNNVNTNIAGNVTNISNTVNNITNGGGIKY
FHTKSTLADSSATGTDAVAIGGNAQATAANSVALGSNSTTANLSAAGYNPGTGLSGTTPTGEVSVGSAGKERRVTNVAAAGSAATDA
VNVSQLOSAIIGSTANAVAYDDGTAKTVLKGASGKTIINLTAGNLSATSTDAVNVSQLOYATQNQVSNIGNVTNNITNGGGIKYFCHAN
STQADSSATGSNSVAVGDRASSLGGSSVAMGDGATAVGAASIAIGNNAQNVGNSNSVAIGGDSKAGDRSVSLNGADTSLSSWGAV
GTNANVSAALGTAIGAGANVSGANSTAIGANAVASATNSVALGSNSTTANLSAAGYNPGTGLSGIASAANGEVSVGAAGKERRVTN
VAAGSAATDAVNVSQLOQSEDAKVNTINNNVNNLSGSVTNISSTVNNITNGGGIKYFHTNSTLADSSAGGANSIAIGGGAATSSSAGLS
DNMAIGTNATASYGKNIAGGGAQATGGTYDGGYNVALGENANATAGTNAWGHNTAIGANTVINGVNSVALGISATTSGSGSMAFGSA
AQASADYAIASGAGANASAVNSVALGSNSTTANLSAAGYNPGTGLSGIASVANGEVSVGSAGKERRVTNVAAAGSAATDAVNVSQLO
SEDAKVNTINNNVNNLSNNVNSNIAGNVTNISNTVNNITNGGGIKYFCHANSTLADSSATGTDAVAIGGNAQATAANSVALGSNSTTAN
LSAAGYNPGTGLSGTTPTGEVSVGSAGKERRVTNVAAAGSAATDAVNVSQLOSAIIGSTANAVAYDDGTAKTVLKGASGKTIINLT
AGNLSATSTDAVNVSQLOYATQNQVSNVGNVTSNLSNNVNTNIAGNVTNISNTVNNITNGGGIKYFCHANSTLADSSATGTDAVAIGGNAQ
ATAANSVALGSNSTTANLSAAGYNPGTGLSATTPTGEVSVGSAGKERRVTNVAAAGSAATDAVNVSQLOMSEDAKVNTINNNVNNLSN
NVSNIAGNVTNISNTVNNITNGGGIKYFCHANSTLADSSATGVDAVAIGGNAQATAANSVALGSNSTTANLSAAGYNPGTGLSGIA
SAANGEVSVGAAGKERRITNVAAAGSAATDAVNVSQLOQSEDAKVNTINNNVNNLSNNVNSNIAGNVTNISNTVNNITNGGGIKYFCHAN
STLADSSATGTDAVAIGGNAQATAANSVALGSNSTTANLSAAGYNPGSAAALSGTASAANGEVSVGAAGKERRITNVAAAGSAATDAVN
VSQLOQSEDAKVNAEGAATAAALGGGTYNTTGAITSPTYIAGGKTFNNVGDVVTNIDGRVTQNSTDITNLNTTIDNGTIGLVQOQATPT
STITVAKDTGGATVDFRGTGNATRTLTGTTAGELSATSTDAVNVSQLOYATQNQVSNIDNTVSNLSNNVNTNIAGNVTNISNTVNNITNG
GGGIKYFCHANSTLADSSATGVDAVAIGGNAQATAANSVALGSNSTTANLSAAGYNPGTGLSGIASAANGEVSVGAAGKERRVTNVAA
AGSAATDAVNVSQLOQSEDAKVNTINNNVNNLSNNVNSNIAGNVTNISNTVNNITNGGGIKYFCHANSTLADSSATGTSNLAAGPAAVAS
ATDAVALGNGAKATNAGAVALGAGSTTTAVATSGTTIGGITYTFAGVAPSSTVSGAAGSERTITNVAAGRSLSATSTDAVNSELFA
TNQQVTRNTADITNLNNMNIGSVGLVQQDATRTITVAKATDGTRVDFGTGGARQLTGVAGAVNATSVDAVNVSQLYGVSQSVAD
AIGGGSTVNTDGSISAPTYVVDGTTVHNAGDAISNLDNRVTQNTTDISTINNTLNSITTGAGVVKYVHNSTLADSLAKGAESVAIGGN
AQSOAANSVALGSNSVADRANTVSGAAGAERQITNVAAAGTADTDVNVAQLKASGVINTDGTNAAVTYDHNADGSANYNSVTMNG
VAGGTTIHNVAAAGSAADDAVNVSQMNAIASSVSNIIGSAGNPLFTADGNRDEAAVASGTHATAMGANAKASAANSVALGANSVADRE
NTVSVGSAGNERQVTNVAAAGTATTDVNQVGLNQAIAGASIGNLPAGMSAKDYTDDQQINAVQNGVNQVAKNAYAGIAAATALTMI
PQKTIAVGVGGGSYKGSQAVALGISARITQNLKMKAGAGTSSQGTTVGLGASYQW

SEQ ID NO: 18 (EPEC)

MLIQQNSEVINQLAGNTSETYIEENGASINYVRTNDTGLTFTDASAAGIGSTAVGYNTVAKGDN SVMAGYNSFAEGHSSVAIGQGSYS
GVETSI ALGSESVSSRVIVKGSRNTSVSEEGVIVGYDTDGE LLGALSIGDDGKYRQIINVADGSEAH DAVTVRQLQNAIGAVATTPT
KYYHANSTAEDSLAVGEDSLAMGAKTI VNGNAGIGIGLNTLVLADAINGIAIGSNARANHADSIAMGNGSQTRGAQNTYTA NM DAP
QNSVGEFSVGSEDGQRQITNVAAGSADTD AVNVGQLKVTD A QVSQNTQSITNLNTQVTNL DTRVTNIENGIGDIVTTG STKYFKTNTD
GVDANAQGKDSVAIGSGSIAAADNSVALGTGSVANEENTISVGSSNTQRRI TNVAAGVNATDAVNSQLKSSEAGGVRYDTKADGSID
YSNITLGGGNGGTTRISNVSAGVNNNDAVNYAQLKQSVQETKQYTDQRMVEMDNKLSKTESLGGIASAMAMTGLPQAYTPGASMAS
IGGGTYNGESAVALGVSMVSANGRWVYKLOGSTNSOGEYSAALGAGIOW

SEQ ID NO: 19

GSGGGG

SEQ ID NO: 20 (*Haemophilus aegyptius*)

GTACCGCACGAGCTGGCAAAAAGGCACGGCAGTCTTTGTCGAAGCCATGATTACAAGTTGCTAGGTAAAATCAAACGTATAC
 TGAGGAAATTTAAAGGCACGCATTTAGCAGGTTAGAACCTCGCACTAAGCCACAAAGATGGCGAAGTGAATCTGTCAGCAAA
 AAACAAAAGCGCGCATAAAGAAAAACGTGAAGATAAGAAAAACAGAGGCAAAGAAAAAGTAAAATTGCGTCATAAGGATACAA
 AAAATATCGCAAAACGACGCAAGCCAAGTAATAGTAATTTAATTAGGTATGTTAGGCAATTACATAGGA
 AATTTTCTATATTGCTTAACGTTTTTATAGTAGAAGTATAACTCAGTTATGGTTATGGTTACATAGTATAAGTTTACTTGT
 CTAGTCACTTAATAACCTTAATAATTGAGGATTCTTATGAAAAGAAATTATTAAAACAATCTGTAATCGCTGTGTTAGATGGT
 GGCACTACTGTTCTAATTATGCTTAGCACAAGCACAAGCACAAGTCAAAAAGATGAACTTAGTGAGTTAAAGAAACAAG
 TAAAGGAAATGGATGCTGCTATCGATGGTATTCTGATGATAATTGCTTATGAAAGCTGAAGTTGATGCAAAACTGATCAGCATT
 CGCTGCTTGGTAGACATAACAGACTCAATAATTAAAACGATTGCAAGAGAAAAGCAAAGGTGATTCAAGTGAAGCAGTGT
 AAAATGAAGCTCTGAAGAACAAAATGATGAGTTTGTAGCGGATATTACAGCTTAAAGAGGGAGTTGATGGTTAGATGATGATA
 TCGCAGGTATTCAAGATAATTCTGATATAGAAGATGATAATTCAAAATTCTGAGACATCGCAACTAACACAGCGGCAATCGC
 AACTCACACTCAACGTCTGATAATTAGATAACAGAGTAAATAACCTTAAAGATCTTAAACGTTGCTGCTCAAGCTGCA
 TTAAATGGTTATTCCAACCGTATAACGTAGGTAAATTAACTGCTGCTGTAGGTGTTATAATCTCAAACACTGCAGTGCTG
 TAGGTAC

SEQ ID NO: 21 (*Haemophilus somnus*)

ATGAAAAAAAGTACAATTAAATATTCACTATTGGCATTAGCATTGGTTAGGGTAAGTGCTCTGCTTGGCAGCCCCAACAA
 GTACAAGTACGACTACTGGACCAGAGGCGCCTCTACAGGCCCTGCTCCTACGGCGAAAGACCCCTAGCAGAAACAGCGTTAGCCTA
 TGATTGGAGAACGAAGTGTGCTATCTCGTATGAAAGCGGGTAGTGGATGCAATTGGGCTTGATCTGAAAAGAAGTCATCAA
 GGCTGGAATGAGGTAATTCTCTCCCTCGTATCGATGGAATGGAAGGATAAACAGACAAAAGATCAAATAGCAATGTTGATAAGAA
 CGGTTGATAATTACAAAAGAGCTGGTCGGATCGTTAGTACAAACATTGAAGATATTAAAGAACCTTAAAGAGCTTACGGTTTGT
 AGAAGATGTGAACGAGACTGAAGCACGCAATTCTCAAGAATAGATGAGAATTAGAAAGATATTAAAGAACCTTAAAGAGCTTAC
 GATTTGTAGAAGATGTGAACGAGACTGAAGCACGCAATTCTCAAGAATAGATGAGAAAATGAGAAGGACATTAAACTCTTAAAGAGC
 TAATGGATGAGGATTAAATTCACTTAAACCCAAATTGAAGATGTAACACTCACATTCAAGATGTCATGATAACGTTAATTGGC
 ATTGAGAGATTAAATGGAATGCCAAAGTTGACACTGCTATTGAAGGACTTACTTCAGGTTGAGCGATTACAAGCTAAAGTC
 GATGCAAATAACAAGAAACTGAAGACGATATTGCGGACAATGCAAGGCTATTCACTAGCAACACAAAAGGTATTGCTAAAATACCA
 AGGATATTCTGACTTGGACACCAACCAAGCAAATGTTGGAAAATGACAAAAACTGATGACCGGTTAGAATCTTAGCAACAGA
 AACAAAGCAAAGGTTGAAAGATTGATGTCAAAACACAATTAGATCAAGCGTCGAAATGTCGCGGTGAGTAGACATAACT
 GAGCAAGCTATTGCCAAACACTGCAGGCTTAGTCATGTGAATAAACGTCGATACACTCGACAAAAACACCAAGCGGTATCG
 CTTCTGAGTCGCTTAGGTATGTCGCAATTCCACTGCTCCGGTAAATCTAGTGAGCTTAGGTGTCGGTATCACCCTGGCA
 AAGTGCTACTGCTATTGGAGTATCTCTATGAGCAACTGGTAAATGGGTTGTTAAAGGCGGTATGAGCTATGATACACAGCGTCAT
 GCTACTTCCGGGGTCTGTCGGTTTTCTTAACTAA

SEQ ID NO: 22 (*Escherichia coli*)

ATGAAAACGTAAACGTAGCTTACTGGCACTCATAATTCAAGCAACATCCAGCCCTGTTAGCTGGTATACCATTGAAGCGG
 CGGCAACAGAGCTTCAGCATTAAACTCTGGCATGTCGAATCGGAGATTGAGCAGAAGATTACCGCTTTAGAACGCACAGACAA
 CAGCCCCGCTCGGTATACCTATTGACTGAACATCACTACATCCCTCTGAAACACCTGATACCACTCAGACTCCACTGTCAGACA
 GATCTGACGCAAGGACAAAAACCGTTGCCGCTACAGGTATGTCAGACAACGTTACAGGCTTATCAGAGCATGATCAACGCCGACAGT
 CTGCGGTAACGAGCAGCAAACGCAAATTACAGAGCAACAGGCGCAGATCGTAGCCACACAAAAACGCTGCCGACTGGAGA
 TACGCAAATACCGCGATTACAGGAAATGATTAATGCCAGACTGGCGCTCAAAATGAGGCTAATCAGCGCACCGCCACTGAACAA
 GGGCAGAAAATGAATGCGCTGACAACCGATGTGGCAGTACAACAGCAAATGAAAGGACTCAATACGATAAAACAAATGCAAAGTCTGG
 CGCAGGAGTCTGCCAGGCACATGAACAAATTGACAGCCTGTCAGACGCTAACCCAAACGCAACACAGTTAACCAACACCAAAA
 ACGGGTTGAGATAACAGCCAGCAAATTACAGCTCAATAACCAATTCTAGGCTCAAAACAGTTGAGTGTGACAAATCGTAAAGAA
 GCCAATGCGGGAACTGCATCTGCCATCGCTATCGCTCACAACCAAGGTTAAACCGGTGACGTGATGTTGTCAGCGGGAGCGG
 GAACCTCAACGGTGAATCTGGTGTCTGTCGGAACATCATTAAATGCCGGAACGCATACGGTACTTAAAGCGGTATTCTGCCGA
 TACACAATTCTGATTCCGGCGCAGGTGTCGGGTGGGATATTCTTCTAA

5 SEQ ID NO: 23 (*Escherichia coli*)

ATCGCCAAACAGCGTCGGCGTCTGGCCAGTAAGAGACTTGCTGACGGTAGATTCTGGTTAGTGTGCTGACATCCTCACCTTCA
 AACAGTAACGTTCCGCTGGTGGCTGATCAATGAAGCAACTATTTCAGCAGCTACTTTGCCACAAACAGAAGGACCGGTAAATT
 ACTTAAATTGCCAGCAGCAGCAGCAGGAAATTGATGTTATTAAAGAATCTTCGATCACCCGCCAGATATCCTACGTTGAGCTGAAG
 CAAAGGACTATTCTCTGATCGCTGTTCCCTTTCTGATTTTACTAAAAACAGTTATCCTTCGCAAGGATAAGGGGGAACTCTC
 TTCTAGTAATCAGGTATAATTGTTAATCAAGCAGCAATTGCTGATTATGGACGGTACAACAGGAGGTTTCCGATGCTTATCT
 TTATCCGATTCTCATTGGTCGCGCTGGTATTGTCGGCGGGCGTCAAAATCGTGCCGCAGGGCTATCAATGGACGGTAGAACG

TTTGGTCGCTATACCAAAACGTTACAGCCGGGCTCAGTCTGGGGTGCCTTATGGATCGCATTGGTCGCAAGATCAATATGATG
 GAGCAAGTGCCTGATATCCCTCCCAGGAAGTTATCTGAAAGATAACGCCAACGTTACCATCGACCGAGTCTGTTTATTCAAGGTGA
 TTGACCGGCCACCGCGGGCTTATGAAGTCAGCAATCTGGAGCTGGCAGTCATCAACCTGACCATGACTAACATCCGTACCGTGGGG
 TTCAATGGAACCTGACGAAATGCTCTCAGCGCAGACGATCAACTCAGCCTGCTGCAGTATTGCGATGAGGCCACCAACCGTGG
 GGGATAAAAGTCACCCGTTATGAAATTCCGACGTGCGCCACCCGAGAGCTTATCTCTCAATGAACGCGCAGATGAAAGCGGAAC
 GTACCAAACGCGCTTACATTCTGAAGCGGAAGGGATCCGTAGCGGAAATCCTCAAAGCGAAGGTGAAAACAGTCGCAAATCCT
 GAAAGCGGAAGGCGAACGTCAGTCGGCGTTTACAGGCTGAAGCGCGTGAACGTTCCGCTGAAGCAGAAGCCCGGCCACCAAAATG
 GTGTCGAAGCCATCGCCTCCGGTATATTCAAGGCGTGAACCTACTCGTAGCGCAGAAATACACCGAAGCGTTACAGCAGATCGGTT
 CCTCCAGTAACACGAAAGTAGTGTGATGCCATTAGAGGCCAGCAGCCTGATGGGTCGATTGCCGGATTGCCAGCTGGTGAAGA
 CAGCGCCAACAAGCGGACTCAGCCATGATGGAGTTAATAGTCGTCATCCACATATTCTGGCTCAGTCGGCGTTGCTGCTGG
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 GGATAGTGTGTTTTAGATATTCCAGGACGTTTATTGACCTTGTGCGTATACACCCACCCCTTCAGTAATCAGGCTGGTCCA
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 GGTAGCAATGCCGGTCCAGATTCAATTTCATTAAAATCTCAAATTCTCATTAAATTTCTGCTGGTAAACCTTAA
 AAATTGAGATTATCAAAGAACGCAATTAGCACACATCAGGAAACGCTTACGTTAGTCCAGAAACAGAAATTATTCGTTATC
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 GATGGTGTACGCCAACAGACAAAATGCGCTTACATCACACAAATGGCGCGTAGATTTCGATTAAATTGCAACGCGATT
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 CTATTGACTGACATCACTACATCCCTCTGAAACACCTGATACCAACTCAGACTCCACTGTCGACAGATCCGACGCG
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 AGCAACGCAAATTACAGAGCAACAGCGCAGATCGTAGCCACACAAAAACGCTGCCGACTGGAGATAACGAAAATACCGCG
 TTATCAGGAAATGTTAACAGCAGTGGCGCTCAAAATGAGGCTAATCGCGCACCAGCACTGAAACAAGGGAGAAAATGAATGCG
 CTGACAACCGATGTCGAGTACAACAGCAAATGAAAGGACTCAATACGATAAAACAAATGCAAAAGTCTGGCGCAGGAGTCTGCC
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 CCAGCAAATTAAACCGCTCAATAACCATTCAGTCGCTAAAAACGAGTTGATGACAATCGTAAAGAAGCCAAACGGGAAACTGCA
 TCTGCCATCGTATCGCTCACACCACAGGTTAAACCGGTGACGTGATGGTGTAGCGGGAGCGGGAAACCTCAACGGTGAAT
 CTGGGTGTCGGAACATCATTAAAGCGGAACGCTACGGTACTTAAAGCGGTATTCTGCGGATACACAATCTGATTTCGG
 CGCAGGTGTCGGCGTGGGATATTGTTCTAATATTCAATCCTCAATATAAAAGAGCAAGGAAGCTGCCGGTTCACCTTCTCAT
 TAATTGTCATTAAAGTTAACATGATGAATAGCTCATTAAATCGTTTCCCTGCTGGCGTTATATTACTGGCTGGCTGTA
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 CTGTTTACGTCAGGTCTATATAACGTCATTGTTATCATCACACAGGAAAAGTCGCCATTGAAAGAAGGCCAGTTGGGTTA
 TTTAAATGAAGGAGCAAAGGAAAATACCCCTGACGCTATTGATTGATTGCGTTATTGCGCTTCTGCAAGTAGTATT
 TAGCCTCCCTGGTCACGCTGTGAATGTTAACACGAAATCCAGGAAGGCTTATTGCGCTGGGGCGCATTATGTTAGAAAGTTGCA
 GCATATTCTTCGGTCAACCGGGATTCACTGATTTCACCCGCCGATGATGACAGCAGCGGAGAGATTTCGATAATCGGCC
 GTCGGCGCTGTCATCACCGGGCAGGCATTGCCAGCGCCAGTAGCTGGTGCCTAGATTGCGATTCTCGATATGCC
 TCCGCCACCTTCCAGCGTGCAGTTGACGTCGGCACTGTCAGCTGCCGGTCAACAGATTACCAAGCTGCCGCTCT
 CCAGGTTAAAGGCCACCTGGCGCCTGGCGCAGTAAGGTCAATTGTTGAGATGCTGCGTGTAGGTCGATAACCATT
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 TTCACTGTCGCCAACGCC

SEQ ID NO: 24 (EPEC)

ATGAAAACGTAACGTTACTGGCACTCATATTCAACATCCAGCCATTGTTAGCTGGTGAACATTGAAAGCGG
 CGGCCAACAGAGCTTCACTCGGCCATGTCGAATCGGAGATTGAGCAGAAGATTACCGCTTTTGAACGCACCGACAA
 CAGCCCCGCTGATATAACCTATTGACTGAAACATCACTACATCCCTCTGAAACACCTGATACCAACTCAGACTCC
 GACTCCGCTGACGAGACAAAAACCGTTGCCGCTACAGGTGATGACAGACAACGCCGTTATCAGAGCATGATCAACGCC
 GACAGTCTACGGTAACGATGCCAGCAACGCAAATTACAGAGCAACAGGCCAGATCGTAGCCACACAAAAACGCTGCC
 GCGACTGGAGA

TACGCAAAATACCGCGCATTATCAGGAGATGATTAATGCCAGGCTGGCGCTCAAAATGAGGCTAATCAGCGCACTACCACGGAAACAA
 GGGCAGAAAATGAATGCACTGACAACCGATGTGGCAGCACAACAGCAAAAGAAAGGGCTCAATACGATAAACAAATGCAAAGTCTGG
 CGCAGAAGTCTGCCAGGCACATGAGCAAATTGAAAGTCTGAGACAAGATTCCGCACAAACGCAGCAACAGTTAACCAACACCCAAAA
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 GCCAATGCCGGAACTGCATGCCATCGCTATGCCACAACCACAGGTAAAACCGGTGACTTGATGATGGTCTCAGCGGAGCG
 GAACCTTAACGGTAATCTGCCGTCTGCCAACATCTTAAATGCCGGAAACGCATACGGTACTTAAAGCAGGTATTCTGCCGA
 TACACAATCTGATTCGGTGGGGTGTGGGATATTCTGTTCTAA

SEQ ID NO: 25 (EAEC)

ATGAAAACGTAAAGCTGCTTACTGGCTGTCGTTGCTACCGCGTAAGTCCATCTCGTTGCCGGTGTACTGTTGAGGCGG
 CAACGACAGAATTAACCGTAATCCAGCCAGGAATGTCGCAATCGAAATTGATCAGAAAATTGGTCGATTTTAGAAAGGACAGGGAA
 TAGTGTAGCCGCACAAAATTATCTGATTGCGCATGATTACAGACAACGACGCCCTCAGGAAAATACAGCTGCTCTCCCGTACAGCCC
 ACCAATACGCTGACCCGATAACCAATCAAGCGCAGACCGACCGCAGACACGGGAGGATACGCCATTAGGACGCGCAGCACGCCG
 CCAACTGGGCTCACTGAAAGCTGATGACGCGCAGCAGCCATCACGGTGGCGAGACGGATATTGATGCCAACAGCCGATTCA
 CGATACCCGTAATGATGTCGCCAGTGCAGTCAGACGTACCAACATAAAAGGCGATGTCGACATGCCAGTCAACGGCTGACCAT
 GCCAACGCTAACGCCAACACCGCTCTGATTAACGGCGTAAACTTCCGGTGTGACAGAAAACAAAACACATGAAACAGAAC
 GCAGCGATATTGCTGACCAGCAGAAAATGTTGGCATAAACGAGAAAACAGATGTCGCCAGACACGGGAGGATACGCCATTCA
 GGACGCAACATGCCAACACTGGGCTCACTGAAAGCTGATGACGCGCAGCAGCCATCACGGTGGCGAGACGGATATTGATGCC
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 GCGGATAATAGCAGCAGATTACTACGCTCAATAACCATTTAGTCGCTGAAAAACGAAGTTGAGGACAACCGTAAAGAACGCAATG
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 CAACGGTAAATCTGCCGTCTGCCAACATCTTAAATGCCGGAACGCATACCGTATTAAGCGGTGCTCTGCCGATACGCAA
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SEQ ID NO: 26 (UPEC)

ATGAACAAAATTTAAAGTATCTGGAATCCGGAACAGGCAGTTACACCGTTGCCAGCGAACGGCGAAGAGCCGTGGAAAAAAA
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 GCCAATGATTAGGCATGGCTCAGCAGGTGACGGCTGGGTTGCTATCGTAAAGGGCAAAAGCAAATACCTTATGAAACACTAGT
 GGCAGGAGTACAGCTTCTAGGATATGACGCGATAGCCGAAGGTGAGTACAGTTCTGCCATGGGTCAAAACCCCTGCAACTGGTGGAG
 CATCCATGGCTTCGGGTTAGTGCAAAAGCAATGGGTGACAGAACAGTGTGCGCTAGGTGATCGTCAAGTAAATGGCAGTC
 GATGGCTTTGGCTTACGAAAGACGAATGGTTTACATCTTGTATTGGGACTCTCCCTGCCATGGTAAAAAAACTATT
 GCGTTAGGAAATACGGCTAAAGCTACGAAATTATGAGCATGCCCTCGGTATAATGCCAATCGTCAAAGAGTATGCAATGGC
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 GCAAGTCAGGCATCTGGCGAATCCAGTATTGCAATTAGTAACACCAGTGAAGCCAGCGAACAAATGCCATTGCGCTGGGCAAGGTA
 GCATTGCAAGCAAAGTGAACCTACGCTGGGAAGTAACAGTTGTCCTGGGAGAGAACGCCATCGCATTGGGAGAGGGTAGTGC
 CGCTGGTGGCAGCAACAGCCTGCTTCGGTAGCCAGTCCAGGGCAACGCCAATGATTCTGCGCATCGGTGAGGGCTGAGCA
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 TTAGGCCGCTCACGGGAAAGATAAAACTGCCAGTGTAAATCACTAACGTGCTAACGGTCAGTCTGCTGCCACCAGCAACGATGCCAT
 TAATGGCTCACAGCTATAGCACTAAATAAGTACATCGCTGATGCGCTGGTGTGATGCGAGAAGTCACGCTGACGGTACTATCACT
 GCACCGACTTACACCATTGCAAATACCGATTACAACACGTGCGTGAAGCCCTGGATGCCCTGATAATAACGCGCTGCTGTGGGATG
 AACGACGAGGTGCTACACCCAGGCAATGCCAGGAAATCACCAACGTTGGGCTGGTGTGATCTCTCCACAACCAACTAC
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 AGCGAAACCTACATCGAGGAAAACGGTGGGTATTAACATGTACGACGACAGCCCTAGCGTCAACGATGCCAGCAGTGTAGCCATCGGT
 CAGGTATTGGCGCTACAGCTGAGGTTATAACGCAAGTGCCTCTATGCCAGCAGTGTAGCCATCGGTCAAGGACAGCATCGCGAAGT
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 GCAAGCTGAGTGGGTATCGCTCTGCAATGGCAATGACGGCTGCGCAGGCTTACACGCCGGTGCCAGCATGGCTCTATTGG
 TGGCGGTACTTACAACGGTGAATCGGCTGTTAGGTGTGATGGTGAACGGCAATGGTGTGGGTCTACAAATTACAAGGT
 AGTACCAATAGCGAGGGTGAATACTCCGCCACTCGGTGCCGGTATTCACTGGTAA

SEQ ID NO: 27 (EHEC)

ATGAACAAAATTTAAAGTATCTGGAACCCCTGCCACAGGGAAATTATACTGTTACCAAGCGAAACGGCAAAAGCCGTGGCAAGAAAT
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 GTAGCCAGTCGAGAGGCTTAAACACCATGCGTTAGGCACAGCCAGTAATGCAACTGGTGTGAGACGACTCTGCGCTGGTAGTAATAG
 CAGTGCACCGGTATTAACCTGTCGCGCTGGCGCAGATTCCATTGCGGATTAGACAAATACCGTCTGTCGCAATAGTCATTA
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 ACTCGGTAGCAAAAGGCTGGAGGGCTGCACTGAGTGTGATGACGGTACTGTTACAGCACCACCAACCTACAATTAAAAATGG
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CATGGTACTAGTGGCCAACGTGCCAGCGTAATCACCGATGTTGCGGATGGCACGATTCAGCCTCCAGTAAGGATGCGGTTAACGGTT
 CCCAACTGAAAGCTACCAATGACGATGTCGAAGCCAACACCGCCATATCGCTACTAATACCAGCAACATTGCCACGAATACGGCAAA
 TATTGCCACCAATACCACCAATATCACCAACCTGACGGATTCCGTTGGTGACCTTCAGGCTGATGCCCTGCTCTGGAACGAAACTAAA
 AAGGCATTCACTGAGCTCACGGCCAGGATACCACCAACGAAATACCAACGTTAAAGATGCCGACCTGACGGCTGACAGCACTGATG
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SEQ ID NO: 28 (EAC)

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SEQ ID NO: 29 (*Burkholderia fungorum*)

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SEQ ID NO: 30 (EPEC)

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SEQ ID NO: 31 (Shigella)

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 CGCTAATGGCAGTATTAGTGAGGACAGTACCGATGCGTAGTGAACGGTCTCAGTTGAATGCCAGCAATATGATGATTGAG
 CAGCAACACCACCAAAATTCAATCAGCTCGTGGTAACACCGACGCAACCTATATCGAAGAAAATGGCGTGGTATCA
 ACTACGTTCTGACTAAGGAAATGGCGTGGTATTGGTTATGACACCAGTACGCCGAACTGCTAGGTGCAATTGCAATTGGT
 ATGACGGTAAATACCGCAAATCATCAACGCTAGCTGATGGTTGAGAAGGCCATGACGCCGTTACGGTGCAGTGCAGAACGCT
 ATTGGAGCGGTGCCACTACGCCAACCAAGTACTTCAAGGCCACTACGCCAACAGACTCACTGCCGTTGGTGAAGACTCGCTGGCA

ATGGGTGCGAAAACGTGCGTTAATGGTAATGCAGGTATTGGTATCGGTTGAACACTCTGGTCTGGCTATGCGATCAACGGCATG
CTATCGGCAGTAACGCACGCCAAACCATGCAAACAGTATCGCAATGGTAACGGTCTCAGACCACCGTGGTCACAGACTGGCTA
CACCGCCTACAAACATGGACGCACCGCAGAACTCTGTAGGTGAGTTCCTGTCGGTAGTGAAGACGGTCAACGTCAAGACTACAAACGTC
GCAGCTGGTTCAGCGGATACCGATGCGGTTAACGTGGTAGTTAACGTGAGTGAAGACGGTCAACGTCAAGACTACAAACGTC
CTAACCTGAACAATCAGTCATAATCTGGATACTCGCCTACTAATATCGAAAACGGTATTGGCAGATTGTCACCACCGTAGCAC
CAAGTACTTCAGTCAACACCGATGCCCTAGTGCACGCCAACGGTAAAGATAGCGTTCTATTGGTCTGGTCCATTGCTGCC
GCTGACAGTCAGCTGCACGGTTACCGGTTCCGTTGCAGAGGAGAAAATACAATCTGTAGGTCTTCTACTAACCAACGCCGG
TCACCAACAGTAGCTGCCAGTGTAAATGCCACCGATGCGGTTAACGTGTCAGCTGAAATCTTCTGAAGCAGGGGAGTGCCTACGA
CACCAAAGCTGATGGTTCTATGACTATAGCAATATCACCCCTGGTGGCAACGGCAGTACGACTCGTATCAGCAACGTCTCCGCT
GGCGTCAACTACAGACGCCGGTGAACTAGCGCAGTTGAAGCAGGAAAGCAATACACCGATCAGCGATGGTTG
AGATGGATAACAAACTGTCTAAACTGAAAGCAAGTTGAGCGGTTATCGCTCTGCAATGCCAATGACCGGCTGCCAGGCTTA
TACACCGGGTGCAGCATGGCTCTATTGGTGGCGGTACTTACAACGGTGAATCGGAGTTGCTTAGGTGATCGATGGTGGC
AATGGTGTGGGCTACAAATTACAAGTAGTACCAATAGCCAGGGTAATACTCCGCCACTCGTGCCTGGTATTCACTGGTAA

SEQ ID NO: 32 (Brucella melitensis)

ATGCTTTTTTAAAAAAATATCGATAACAGCCATGGTGGCTTGATGTTGTCGCTGAGTCGACGCTGCGAAGGCGGAGGAAA
ATGTTCGCAGGTGAAACACTCCTCCTGTTTGTGAGCTTGTGAAAACACCAGGGCTGGCAATATTGCTCTGATTGACCTCG
AGTGATAGCGCCAGACAACAACCTACGCTCTGGGGCATTGTCCTGGGATCGCTGGTCTTTGACTCTCGGAGGAGAACCGCAAC
CTAATTAGTGAAAATAGGCAAGTTATTAAATAACAATACGACTGCCATTGGCAGAACCGTACCTCGATTAGTACCAATGCCAAGGGC
TTGCCACAATAGGGCTGCTACGACAGAATAGTGCCTGCATTCCGCTCTGGCAGCGAGTTGACGGGTTGCAAGGTCAGATCAA
CAGCCCCGGAAAGAGGCCAGTGCCTGGAGCTGCAAATGCCCTGCTCTTCGGGCTAACGATATGATAACCGTCCAGGAAGGTGCA
ATCGCTACCGGTTGGCGGTTAAAGGTAGCACCGCTTGGCTGCTGGTACGGTTACACAAGCAAGAACGAAACGCTCGTTATA
ACGTAGTGTAGCTTACAACGAAGCTGGCACATCCTGGAATGCAGGTGCAAGCTTACGCTTAACCAA

SEQ ID NO: 33 (Brucella suis)

ATGCTTTTTTAAAAAAATATCGATAACAGCCATGGTGGCTTGATGTTGTCGCTGAGTCGACGCTGCGAAGGCGGAGGAAA
ATGTTCGCAGGTGAAACACTCCTCCTGTTTGTGAGCTTGTGAAAACACCAGGGCTGGCAATATTGCTCTGATTGACCTCG
AGTGATAGCGCCAGACAACAACCTACGCTCTGGGGCATTGTCCTGGGATCGCTGGTCTCTGACTCTCGGAGGAGAACCGCAAC
CTAATTAGTGAAAATAGGCAAGTTATTAAATAACAATACGACTGCCATTGGCAGAACCGGATCGACGCCATGCCAAGGTG
TTGCCACAATAGGGCTGCCATTGCCAGAACAGGGCCGGATCGACGCCAATGCCAAGGGCTTGCCGACAACAAGGTGCCATTGG
CCGAAACAGCGGTGGATCGACGCCAATGCCAAGGGCTTGCCGACAACAAGACTGCCATTGGTGAACAGTGGTCGGATCGATACC
AATGCCAAAGGTGTTGCCGACAATAGGGTGCATCAGCCAAAACCGCGTCGCATCAATGCTAACGCAGCAGGTGTTGCTAGCAATA
GGGCTGCTATCAGACAGAATAGTGCCTGCATTCCGCTCTGGCCAGCGAGTTGACGGGTTGCAAGGTCAGATCAACAGCGCCCGGAA
AGAGGCACGTGCCGGAGCTGCAAATGCCCTGCTCTTCGGGCTAACGATATGATAACCGTCCAGGAAGGTGCAATCGTACCGG
GTTGGCGGTTAAAGGTAGCACCGCTTGGCTGCTGGTACGGTTACACAAGCAAGAACGAAACGCTCGTTATAACGTGAGTGTAG
CTTACAACGAAGCTGGCACATCCTGGAATGCAGGTGCAAGCTTACGCTTAACCAA

SEQ ID NO: 34 (Ralstonia solanacearum)

GTGGTTTCAGGCCATGCCCAATACGCTGCGCAGAAATGGTGTGCAAAACGATCCGGAACGAATTGTGGAAGCGTGGGTGATG
CATATGCCCTGGCGCGAGCGATGGGTATTGGGTTGTAAGGTCGGTTACGAAGCCGAAAAAATTGGCAAAGGGCACAGCATTGG
CAATAGCCTGGGTCACATCGCCTGGTACGAACATTCTGCTACGGGTCACGCTCCGTGCTGGTATGAATGACGAAGTGACACCC
CTCGATTGATGAATATCGTGGCCATCTGACGTATGGGAGCCAGCGGCTTACCGGGTGTGCGATATGAATAATTGCCCATCA
AAAACCTTGCTGACGGCACCGTCTGCCACCGCACCGAGGCCGGTACTGGCAGGCAACTGAACGCCACCAACGAACATCACCAA
TCTGCAGAACAGCATCAAGAGCATCAGCAGTTCGGCGAGCTGGTGCAGCAGTCCTCCGCGGCGGCGGCGGCGGCGGCGGCGG
CTGGACGGTGACGGTGGACTTCAGGCCAAGAACGCTGAGTGCAGCACGCGGCGGCGGCGGCGGCGGCGGCGGCGGCGGCGG
CGTTGTCGGCGACGAGCACGGATGCGGTGAGCGGCAAGCAACTTACGACCAACCAGAACCTGAGCAGCACGACCAACAGAAC
GGACACGAACAAGAGCTGGCGAGACCGAACAGAACGTCGGCGACCGACCAACATCACGAACCTGCAGAACACCCATCAAGAAC
ATCAGCGCGGCTCGGGGGTCTGGTGCAGCAATCGGCCGCGGCAAGGACATCACGGTGGCCAAGGACCTGGACGGTGAGGGGGTGG
ACTTCAGCGGCAAGAACGCTGAGCGACAGCACGACGCTTCAGCGCAAGCTGACGGGTGTCGGCGAGGGGACGCTGTCGGCGACGAC
GGATGCGGTGAGCGCAAGCACGCTCTACGACGAACCGAACATCTGGCGAGTACCAACAAAGGACCTGGCAATACCAACACGCCCTG
ACGACGGCCGAGGGCAATCTGCGTCAACACGACGAGCATCACGAACCTGCGAACACCATCAAGAACATCAGCGCGGCTCGCG
GTCTGGTGCAGCAATCGGCTGCCAGGACATCACCGTGGCCAAGGACCTGGACGGTGACCGGGTGGACTTCAGCGGCAAGAAC
GAGCGACAGCACGACGTTCTCGCGCAAGCTGACGGGTGTTGCGGAGGGGACGTTGTCGGCGACGAGTACCGATGCGGTGAGCGGCGAG
CAGCTCTACGACCAACCAGAACCTGAGCAGCACGAGAACATCTGGCGACACGAACAGAGCCTGGCGAGACGAACAGAAC
TGTGGCGACCGACCAACATCACGAACCTGAGCAGAACACGCTGGTGAACAACATCACGAGCGGTTCGGGGGTCTGGTGCAGCAATCGGC
AGCAGGGCAAGGACATCACAGTGGCCAAGGACCTGGACGGTGACCGGGTGGACTTCAGCGGCAAGAACGCTGAGTGCAGCACGACGTT
TCGCGCAAGCTGACGGGTGTTGCGGAGGGGACGCTGCGCGACGAGCACGGATGCGGTGAGCGGCAAGCAGCTTACGACCAACC
AGAACCTGAGCAGCACGACCAACCAGAACATCGGCGACACGAACAGCTGGCGAGACGAACAGAACGTCGGCGACCAACGACCAA

CATCACGAACCTGCAGAACACGGTGAACAACATCAGCAGCGGTTGGCGGGCTGGTCAGCAGTCGCCGCCGGCAAGGACATCAGC
 GTGGCCAAGAACCTGGACGGTACCGGGTGGACTTCAGCGCAAGAACGCTGAGTACAGCACGGATTCAGCGCAAGCAGCTCTATA
 CGACCAACCAGAACATCTGGCGAGCTACAGCGACGAGCATCAGAACCTGCAGAAC
 ACCATCAAGAACATCAGCGCGCTCGCGGGCTGGTGCAGCAATCGGCTGCCGGCAAGGACATCAGCGAACCTGCAGAAC
 GTGACGCGGTGGACTTCAGCGCAGAACGAGCAGCACGACGTTCTCGCCAGCTGACGGGTGTTGCGGAGGGACGTTGTC
 CGGCAAGAACATCAGCGACGAGCAGCACGAGCTACAGCGAACCTGCAGAACACGGTGAACAAACATCAGCA
 CGGTTGGCGGGCTGGTGCAGCAGTCGGCAGCGGGCAAGGACATTACGGTGGCCAAGGACCTGGACGGTACGCCGGTGGACTTCAG
 CGGCAAGAACGAGCTGAGCAGCACGAGCTACAGCGAACCTGAGTGTGCGAACGTCACGGACGTGAGTGTAGCGTACCAACA
 TCAAGAACACGATGAACACCATCGTAACGGCGGGCTCAAGTACTTCACCGCAACTCGACGCTGGACATGCCAGGGGATGGG
 CCTCGAGTCGATCGCTCGCGCGCAGCCGTCGCCGGCTATGAACCTCGATGGCGATGGCGCAATGCCCGGGCGTGGCGGGC
 AACGCTGTGGCCTTGGCGCGGGTTCGGTGGCGGACCGCGCGAACACGGTGTGGCTGGCGGGCATCGAGGAGCGGCAAGGAGCG
 AACGCTGGCGCCGGTACGGCGACACGGATGCCGTGAAACGTTGCCAGCTGAAGGCGGCCGATCATCAACGGCAGGGCAGGAC
 CGGCCACGGTACGGCAGGCAACCGAGCGCTCGGCGGACTACGGCAACGTCAGCTGGCGGGCAACGGCGCCGGCACG
 GCGATCCACAACGTCGCGCCGGCACGGCGAGACCGACGCGGTGAAACGTCAGCGATGAACGCGGCCATTGCCAGCGTCAAG
 TGAGCAACACCAACGACCCGATGTTCGCGCGGATGGCGACCGCGCTGCAAGCGCGAGCGCCAAAGGCACGCATGCCACGGCG
 GGGTGCAGCGGCCAGCGCGGGCGACAGTCGGTGCACGGGCCAACACGCGCAGTCGGCGGGCACAGTCGGTGCAGCG
 GCGAACATGCGAAGGCAGGGCAATCATGCGTTGCCGCTGGGCTCGGGTTCGGTAGCGAACCGCGCAACACGATGTCGGTGG
 CGGGCAGCGAGCGCCAGATACCAATGTTGCGGCCGGTGTGAGGGTACCGATGCGGTCAACGTCAGCCAGCTGAGCCAG
 CGGGCAGCGAGCGCCAGATACCAATGTTGCGGCCGGTGTGAGGGTACCGATGCGGTCAACGTCAGCCAGCTGAGCCAG
 GTGGCGCGGGCCTTACAGCGTATCGCGCGGCGACCGCGCTGACGATGATTCCGGACGTCATCGGCAGAACGTCGATCG
 GTATCGGCAGCGCGACCTACAAGGGCTATCAGCGGTTGCGCTGGCGCCTGGCACGCATCTGCACAACCTGAAGGCAAG
 ATGGGCGTACAGCAGCGAACGGCAGACGGTGGCATGGCGCGTATCGTACGTGGTAA

SEQ ID NO: 35 (*Sinorhizobium meliloti*)

GTGGCGCTGGACGCCAATCGGTCTCGGCCGGCAGCGGTTCACTGCAATTGGTAACGGTAGTTACCGAATTCAAACGGATCGGTTG
 CCATCGGGCAGTCGATCGCATACGCCAATGTTCGGCCAATCGCAATCGGTGGAGATGATGCCCTCGCTTGGCGAGAGGCCAGCAGAC
 CAAGGCCGGGGCTCCAGTCGATGCCATGGCGTGCCTGCGTACGAAATCGCTGGTAGTCACGCCACCCGGATACGGTGGCCAAC
 GAAGCGGACCCGGCGCGCTGATGCCATTGCAATCGGTACGGATGCAAGGCCAATGGCGACCGGCTCTCGCATCGCAGAC
 AGAACATCAGGCCGCAATGAGCAATCCATCGGCATCGGCGGGCAACACGGCAACAGGCAAACCTCTCGATCGGCATCGCAGCAG
 CGTGGCCAGCGGGAGCAATCCCTAACGCTCGGCGGGCAACAAATGCCCTGGGCAAGGGCTCCATCAGCATCGGTACCGAAC
 GCCGGCGGTCTCGGTGATCGCTTCGGCGTGCCTGCGAGTACGAAAGCAATCTAGATATTCCGGATGACGTCGGCCGCGATCG
 ACGCCATCGCTATCGGTACCAATACCAAGGCCACGGCGACCGGTCGGTCAGCATCGGAACGGCAGTCAGCCAGCGGGAGCG
 CAGTATTGGCGATGCAAGGCTGTGGGTGACAAATCCGTAGTATCGGTACCGAAAGCTGGGCGATGGCGACGAATCGTCAGC
 ATCGGCCTCGTCAACAACGCCGGTTGAAGGGATGACCAATCAAAGGCCAAACCTCTGTGACGCTGGGAGCGCTTCATCAGT
 CGCCGGCATCGAGGCCATTGCTATCGGTGCCAGAACGCAAGGCCAATCGGATCGGTGATTGCAATCGGCTCGCTGCGAAA
 GGCGCCGATCGCGCAGGGCGACGGCGGTGCGCGCAGCGCGTCGCTATAGGCACGGATGCGCTGGCAACGACGCCGTCATC
 AGCATAGGCTGAAATAGCAGTACCTCCCTGAACGATTCCATCAGCATCGTACCGAACGTCGGGATCGGGCGATATCATGA
 TCGGCACAGGTTAGGGACTGGTCCACCTCCGGTCAAGAACATGTCGCCCTCGCGTTGCGGCCAGTCAGAAGGTGAAGGGT
 CGTC
 AACATAGGCGATCGCGATTGGCGGTTCCCGGTTCCCGGAAAGGGATAACACGTCGCCATTGGCACCAATCGGGAAATT
 CGGCGGCGATCGCGATCGGCGACCGGATATCACCGGATCCGGCTCTCGTGGCAACGACAAACACCAACGCCGCG
 ACCTCGGCAACGACAACACATTGGCGGATGCCCGATGGCAGCCGCTACGGCAACGGCAACAAATATCGATGTCGATGCC
 TCGTGTGCGCAATGGTGCCTGCGTACCGAAGTCGGCGTGGCGCTGGGTTCCGGCTGGTTCCGGATACGGGTGCCAGTGGC
 GGGCTATGTGCGGGCGGGGGCTCGACGGCGGACCAAAACGCCATCGAGGGCAGCGCAGAGCACGCCGCGCGGTCGCG
 CGGCAATCCGCAACGGGCTTACCGCAGATCACAGGTGTCGCCGCCACGGCCACTCCGATGCCAACGTCGGCCAG
 AATCGGTGAGACGATGCCAAGACGGCTGGAAGCTACGACGGACAGCAGCATCGACGGCATCGGCACTGGCCGGCG
 CCTCAAAGGCGGCACGGCAATATCGTGTACGCAATCAGATCTTGAGCAACGACGTGAGCATCGATCTGGCG
 GAGATCGAGGTG
 AACAGGGTGACGGCGAGAGATCCCGACACGGGTGCATCCACGGTGCTGGACGAGAACGGCTGAGCTCACGAC
 GCGAGGACACGGCGCTCGGCCGCGGTGACGGCGGGCATCGAACGGCCGGAAAATCACCAATGTCGCTGCCGG
 CAGGGCGAACCGCGTGAACCTCCAGCTCAGGCAAGTCAGGACGGCATCGGCCAATACGGACCGAGCGGGCG
 GAGCTAACCTCGATAGCGTACCCCTGCGGGGGCATGGCGGCCACCGAG
 CCAATCTTGCGCCGGCGCTTGGCGCGCATCGACCGATGCCGTCAACGGCAGGCCAGCTCTCGCG
 CGTGGCGTATCCAA
 CGTGGCGCTGCCCTGGCGGGGAGCGCCTATGACCTGTCAAGGATGAGTGGATGCCCGAAATACCGATCGCGGCCACCGAC

TACAGCAATGTCGGCGACGCCGTGGCGGGTGGCGGACGGCCGGTGGAGCCTCTCGGCGAGGGTGCAGCGTCCA
 ATGTCGGCGCCGGCGAGACGGTGGATCTCGCAGCGCAGCGCAATATCGTCGTCAAGCGGAGACCGCGACACCGTGANCTT
 CGACCTGGCCGACGATCTGGACGTCTCCAAAGCATACGGTGGTGCAGATCCCGCGATCCGAATGCGCCGACCACACTGTTATCACC
 GGCGGTTGATCGTACGGCAGCACCATGCTGGCAGCAACGGCTGGTCACTACCGGGGGCGAGCGTCACGACCGATGGCATCG
 ATGCCGGCGCATGAAGGTACGAATGTGCAAACGGTACGGTGGCAAGGATTGAGGATGCCGTAACGGCGCAGCTCTCGA
 CGTCGGTGCAGTGGCGCTATGACGACAAAGCAGGGCACCCCTGAGCGGGCTAACGGCACCAAG
 ATCACCAACAGCGAATGGCGCTGGCGCTATGACGACAAAGCAGGGCACCCCTGAGCGGGCTAACGGCACCAAG
 ATCGGCTCGATACCGAAGTGAAGAGATCGACAGCGCGTAACCTATATCGAGAGGCTCCAGGGCGATCTGGAGAACGCTGCCGCTA
 TGATACCGACGCTGCCGGCAAGAGGCTCAACACGCTGACGCTGAGGGAGGGAGATCCCGACAAGCGGGTGCATCGCAATGTGGCC
 AGGGCGTGAAGCGACCCGACCCGTCATGTCGGCAGCTCGACGAAAGCAGGGTACACGGGAGGAGAACGCGCTCGCTGCCGCT
 AGTGGCGATCGATCAGGGGCCATCTACACCGACCAGGTTATCGAGAGACCAAGGTGAGCGCGGTGAACAATTATGCGAACAAACGGTT
 CGCGCAGCTCTGGCGAGATCGGGCAGGTTGGAGCGAAGCGCGCAAGCCGCCATCGGACTTGCGGCGGCTCGCTGCCGCT
 GACAATGAGCGGGCAAGCTGAGCGTGGCGCTGGCGGGCTCTGGAGAACGCAAGGGCGCTGCCCTCGGTGCCGGCTACACCA
 CGAACAGCGACCGTCCGGCAACCTGACCGGTGCTGCCGGGGGGAACGTCGGTGCCTGCCGCTCACATCACGCTCAA
 CTGA

SEQ ID NO: 36 (*Bradorhizobium japonicum*)

GTGCGGGCCTCGGCTCCGCAACGCCATCAACGGCACCAACTACGCGGCCGTCGGCTCCAACAACGTCGTCGCCGCAACAACGGCG
 CGGTTGTCGGCTCCGCAACGGCGTACCGGCAACACCCGCGCTCGGCTCCAGTATCGGCATCGCCGGCGCAACAACGCGCG
 TGTGGCTCCTCAGCACCGTCACCGCAGCAACAGCGCGCTGTTGGCTCCCTCAACAACGTCAGCGGCAATAACAGCGGCCCTT
 GGCACCGGACAGAACATCCGCGTAACGGCACGTTGCCATCGGCGATCCAAACATCGTCACGGCAACAACAGTTGGTTCGGCG
 ACAAACACGGTGAACGGGCCAATGTCGGGGTTCGGCGACAACATCCAGCTGGCTCGAACACCCGACCTTGCGCAACACGTC
 CAGCGCCGGCTCATCCGTGTTCGCAGCGCAACACCGTCAACGCCACCAATGCCGTTGATGGCGAACACAGCACCCTGCGAACGTC
 GGCGCTCTCTGCGCATCGCAATGCCACGGCGTTACCGGATCAACCGGATCGGATGGGACCCGGCGCGAACATTTCG
 ACAACTCGGTGCGATCGCAGCGCGACCACGACGCGCGCAACCCAGGTCGAGCTGGCACCGCCAGCAGCACCTACACGATGAG
 CGGCATCACCTCGGCTGCGAGCAAGGCGCGCAGTCCGGACCGACCCAGCTCGCACATCGACGCGCCGGCAATCTGGCGACCACC
 TCGCTGGCTGGCCTGGACTTGCCTCCGGCGACATCAACGGAATCAACTCCAACTGGCGCCCTCAACGGCGCGTCGACAACC
 TGACACGGGAGTCGCGCGGGCGTGGCGTGGCGCTCGCGCGCTCAGCCTGCAATTGATCCTCGCCCGGCAAGATCTGGCTC
 CGGCGCTTCGGAATTCCAGGGACAATCCGGCTCGCGTGGCGCTCGGCTATTCTATTGGACGCCATGCGCTCAACGGCG
 TTCACGGCCGACAGCAAGGGCGCATCGCGTCAAGGGCGCGCGTCGTTGGACGCTGAACCTGA

SEQ ID NO: 37 (*NadA*)

MSMKHFP SKVLT TAILATFCGALAAT SDD DVKAATVAIAVAYNNGQEINGFKAGETIYDGEDGTITQKDATAADVEADDFKGLGL
 KKVVNLTKTVNENKQNVDAKVKA AESEIEKLTTKLADTDAALADTDAALDETTN ALNKLGENITTFAEETKTNIVKIDEKLEAVADT
 VDKHAEAFNDIADSLDETNKTADEAVKTANEAKQTAETKQNVDAKVKAETAAGKAEAAAGTANTADKAEAVAAKVTDIKADIATN
 KADIAKNSARIDS LDKNVANLRKETRQLAEQALSGLFQPYNVGRFNVTAAVGGYKSESAVAGTGFRTENFAAKAGVAVGTSSGS
 SAAYHVGVNYEW

SEQ ID NO: 38 (*YadA*)

MTKDFKISVSAALISALFSSPYAFADDYDGIPNLTA VQISPNA DPA LG EY PVR PPGAGGLN ASAKG IHSIAIGATAEAAKGAAVA
 VGAGSIATGVNSVAIGPLSKALGDSAVT YGA A STAQKDVAIGARASTSDTGVAVGFNSKADAKNSVAIGHSSHVAANHGYSIAIGDR
 SKTDRENSVSIGHESLNRLNQLTHLAAGT KDT DAVNVAQLKEIEKTQENTNKRSAELLANANAYADNKSSV LGIANNYTD SKSAETLE
 NARKFAFAQSKDVLMLKTHSKSVARTTLETAEEHANSVARTTIEETAEHHANKSAAJASANVYADSKSSHTIKTAN SVT DWTVSNS
 T KKAIRESNQYI DNEK RQD LK DTRV DK GLASSA MSLIOLVGVGVNFTAG7GGYRGS M A L A I GSGYKVNNENVALKACVAYA
 GS SDVDMYNA SFN T K

SEQ ID NO: 39 (*Consensus*)

MXXMXXXXXXLAXAIXAXFSXGALAAXTDXXTGPEAXXVIXXPAXXXLXXXXXXXXXXXXXXGLXAXAXXXSSXADAEAXVFK
 GLXXXXXXPNIXXXXXXQTKDQIAMLIRXXXNLXENKXXVXXVAAIKXI PKD LIAKXADV DXXXXVXXAXXRTXAXNNLKGHS
 SHVAANHGYSIAIGDRSKTDRENSVSIGHESLNRLXXXAXXKEEXXENIAQIDXN XEQXXD KXXEXXNXXXXLAXXXXAXX
 XAXXVNLXXXXXXXXXXTNXLXQKIAEXXNXDAXKXAXXXXXXXXXXXXXXNTKDXLX TXXXDXXNSAXXAX
 XTXXIA TE XSXXFXXXXXKXQXXQXIA NNXTVAIXEQXIXXNTARIDXLDRVNXL DEXKAGLASQ AALSGLFQPYNVGKLN VSA
 AVGGYXSXXAXAIGXGSXRFNENXAAKAGVAXDTQXGGSSAGYXVGVNFEW

SEQ ID NO: 40 (primer)

TATCGGCAAACGACGCAAGC

SEQ ID NO: 41 (primer)

GGCGGATTAGCCATTGATAC

SEQ ID NO: 42 (primer)

AACGGTTGATGCCGCCTAG

SEQ ID NO: 43 (primer)

GTGTTGATAGGTGGCACTACTG

SEQ ID NO: 44 (primer)

GUAGAGAAAGCAAAAGGTGATTC

SEQ ID NO: 45 (primer)

CAAAATTCTGCAGACATCCCAAC

5 **SEQ ID NO: 46 (primer)**

CAAAC TG CAG TT GCT GT TAGG

SEQ ID NO: 47 (primer)

ACCTACAGCAACTGCAGTTG

SEQ ID NO: 48 (primer)

CAACTCCCTCTTCTAAAGCTG

SEQ ID NO: 49 (primer)

AGTAGTGCCACCTATCAACAC

SEQ ID NO: 50 (Had4)

CGACGCAAGCCAAGTAATAGTAATATTAATTAGGTATGATGTAATTCTGCTTGAGGCAAATTTACATAGGAAATTTCTATATT
 GCTTTAACGTTTTTATAGTAGAAGTATATACTCAGTTATGGTTACATAGTATAGTTTACTTGTCTAGTTCACTTTAA
 TAACCTTAAATAATTGAGGATTCTTATGAAAAGAAATTATTAAAACAATCTGTAATCGCTGTGTTAGGTGGCACTACTGTTTC
 TAATTATGCTTCTAGCACAAGCACAAGCACAAGTCAAAAAGATGAACCTAGTGAGTTAAAGAAACAAGTAAAGGAAATGGAT
 GCTGCTATCGATGGTATTCTGATGATAATATTGCTTATGAAAGCTGAAGTTGATGCAAACACTTGATCAGCATTGCTGCTTGGTA
 GACATACAAATAGACTCAATAATCTTAAACGATTGAGAGAAAGCAAAGGTGATTCAAGTGAAGCACTTGATAAAATTGAAGCTCT
 TGAAGAACAAAATGATGAGTTTTAGCGGATATTACAGCTTAAAGAGGGAGTTGATGGTTAGATGATGATATCACAGGTATTCAA
 GATAATATTCTGATATAGAAGATGATATTAACTAAATTCTGAGACATTGCAACTAACACAGCGGAATCGCAACTCACACTCAAC
 GTCTTGATAATTAGATAACAGAGTAAATAACCTTAAATAAGATCTTAAACGTGGTCTTGCTGCTCAAGCTGCATAATGGTTATT
 CCAACCGTATAACGTAGGTAAATTAACTTACTGCTGCTGTAGGTGGTTATAATCTCAAACCTGCAGTTGCTGTAGGTACTGGTTAT
 CGTTATAACGAAAATATCGCGCTAAAGCAGGTGTTGCTTCACTCATGGTGGCAGCGCAACTTATAATGTTGGCTAAATTGGAAT
 GGTAATTAGATAACTAATTTCATAACAGAAAATAACCTGTTTGAGTAATATCAGAAACAGGTATTGGTATAGGCTTC
 TTCGACACTCGTTACTAGTGTGGATATGTGAATAAAATCAATAATTGGAGTATTTCATCTATTAAATTGTTAGCGGAT
 AAAATAACTTCGTGTGTTCTCCAAATTCTTAAATTCAATAACCGCTAACGAGCTGGCATCATCTTTG
 TTCAACGACTAAAATTGTAGCAGCTACCGTAGCATTCTTAATCTTATGAATGGCGTCTGCAATTAGAAACCTTCATACCCCTGCTTC
 TGGAAATTCTGTATCAATGG

10 **SEQ ID NO: 51 (Had4)**

MKRNLKQSIVAVLIGTTVSNYALAQAAQAAQVKKDELSELKKQVKEMDAIDGILDNNIAYEAEVDAKLDQHSAALGRHTNRLNNL
 KTIAEKAKGDSSEALDKIEALEEONDEFIADITALEEGVDGLDDDDITGIQDNISDIEDDINQNSADIATNTAAIATHQRLDNDNRV
 MNQKDKRQ-AQAAALNGLQPYWGIILVAVAGGYLISOTAVAVGTCYRYMENIAAKAGVANIECGSATVVA

SEQ ID NO: 52 (Had4 C-terminal)

TGYRYNENIAAKAGVAFTHGGSATYNVGVNFEW

SEQ ID NO: 53 (Gene downstream of Had4)

ATGATAAAATTAGCATATTAAAGTGTATTACCTTCTAGAAGATGTAAGGATTGAGAGAAGTTCATTTCTGTTAGTTGAAC
 CTTTAGAAAACACTTTCTAAAGTACGTTCTCAAGATGTAAGGAAAGGGCTTGCCTAAAGTGTGTTGCTTATAATGCACAACCAC
 TAGGATTGGCTATTACACTTATCGGCAATTCAATACCAATTCCAGATATACCCCAAGAACGAAATAAGTAAAGCGTACCATAT
 CCTAATATTCTGCTGTTTAATAGGGCATTAGCCATTGATACGAATTCCAGAAGCAAGGGTATGAAAGTTCTAATTGAGACG
 CCATTCTACAGATTAAGAATGCTACGGTAGCTGCTACAATTGTTAGTCGTTGAAGCAAAAATGATGATGCCAGCTGTTTATGAACG
 ATTAGGGTTTATTGAATTAAAGAATTGGAGGAACACACAGAAAGTTATTCTGCTAACAAAATTAAATAAAATAG

SEQ ID NO: 54 (Sequence encoded by SEQ ID NO: 53)

MINENLAYLSQLPLEDVKIERSSFSCSVEPLENYFKYVSQDVKKGLAKCFVLINAQPSRIVGYYTALSISIPIPDIPQERISKGVPY
 PNIPAVLIGRLAIDTNFQKQGYGKFLIAADAIHKIKNATVAATIIVVEAKNDASSFYERLGIEFKEFGGTHRKLIFYPLTKLIK

SEQ ID NO: 55 (Histone acetyltransferase)

MINENLAYLSQLPLEDVKIERSSFSCSVEPLENYFKYVSDVKGLAKCFVLINAQPSRIVGYYTLSALSIPIDIPQERISKGVYP
PNIPAVLIGRLAIDTNFQKQGYGKFLIADAIHKIKNATVAATILVVEAKNDASSFYERLGFIEFKEFGGTHRKLFYPLT

SEQ ID NO: 56

GCAAGCCAAGTAACAGTAATGTTAATTAGGTATGTTAAATTCTGTTATATCACACTAGCAATGTGGGTTCTGTATTGGTAT
TAACTAAATTACCGATTAATAAAGCGTAATTAAAGTTAATATCTTGTTGACATTAAAGAATACAAAATGCCCATCACCTAGTG

SEQ ID NO: 57

GCAAGCCAAGTAACAGTAATGTTAATTAGGTATGTTAAATTCTGTTATATCACACTAGCAATGTGGGTTCTGTATTGGTAT
TAACTAAATTACCGATTAATAAAGCGTAATTAAAGTTAATATCTTGTTGACATTAAAGAATACAAAATGCCCATCACCTAGTG

SEQ ID NO: 58

GCAAGCCAAGTAACAGTAATGTTAATTAGGTATGTTAAATTCTGTTATATCACACTAGCAATGTGGGTTCTGTATTGGTAT
TAACTAAATTACCGATTAATAAAGCGTAATTAAAGTTAATATCTTGTTGACATTAAAGAATACAAAATGCCCATCGCCTAGTG

SEQ ID NO: 59

GCAAGCCAAGTAACAGTAATGTTAATTAGGTATGTTAAATTCTGTTATATCACACTAGCAATGCAGGTTCTGTATTGGTAT
TAACTAAATTACCGATTAATAAAGCGTAATTAAAGTTAATATCTTGTTGACATTAAAGAATACAAAATGCCCATCGCCTAGTG

SEQ ID NO: 60

GCAAGCCAAGTAACAGTAATGTTAATTAGGTATGTTAAATTCTGTTATATCACACTAGCAATGCAGGTTCTGTATTGGTAT
TAACTAAATTACCGATTAATAAAGCGTAATTAAAGTTAATATCTTGTTGACATTAAAGAATACAAAATGCCCATCGCCTAGTG

SEQ ID NO: 61

GCAAGCCAAGTAACAGTAATGTTAATTAGGTATGTTAAATTCTGTTATATCACACTAGCAATGCAGGTTCTGTATTGGTAT
TAACTAAATTACCGATTAATAAAGCGTAATTAAAGTTAATATCTTGTTGACATTAAAGAATACAAAATGCCCATCGCCTAGTG

SEQ ID NO: 62

TTAGGTATGATTAAATTCTG

SEQ ID NO: 63

ATAGTATAGTTTACTTGTCTAGTTCACTTAATAACCTTAAATAATTGAGGATTCTTATGAAAAGAAATTAT

SEQ ID NO: 64

CCGACGCAAGCCAAGTAATAGTAATATTAAATTAGGTATGATGTTAAATTCTGTTGAGGCAAATTTCAGTACATAGGAAATTTCATAT
TGCTTAACTGTTTTATAGTAGAAGTATATACTCAGTTATGGTTACATAGTATAGTTTACTTGTCTAGTTCACTTTA
ATAACCTTAAATAATTGAGGATTCTTATGAAAAGAAATTATGAAACATCTGTAATCGCTGTGTTGATAGGTGGCACTACTGTTT
CTAATTATGCTTCTAGCACAAGCACAAGCACAAGCAC

SEQ ID NO: 65

AGGATACGAAAATATCGGCAAACGACGCAAGCCAAGTAACAGTAATGTTAGGCTGTAGTATAGTATAGCTTGTCTAGTTCA
ATTAAATAATCTTAAATAATTAGGATTCTTATGAAAAAAAATTATAGGCTTCGACACTCGTTGCTAGTATAGATATGTG
AATA